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This Newsletter concerns the National Center for School and College Television's Conference on television in science education. The Conference was conducted to assess television materials being offered in science in an effort to stimulate the development of increasingly effective television materials for the nation's schools. Part 1 is a status report of science telecourses being offered in the U.S. during 1966-67 school year. The courses are categorized under curriculum usage level and the information provided includes grade emphasis, frequency of transmission, and whether the telecourses are recorded or unrecorded. Part 2 is an overview of the discussion among the 11 science and television authorities who participated in the conference. The topics subjected to critical analysis are (1) the use of the medium, (2) the quality of the television teaching, (3) the content of lessons, (4) the validity of television as an instructional medium, and (5) the objectives of televised instruction. Part 3 lists science telecourses in current usage. The information provided includes (1) the telecourse title, (2) the producer, (3) the production location, (4) the grade level, (5) the number of lessons, (6) the lesson length, and (7) the frequency of production. (RS)

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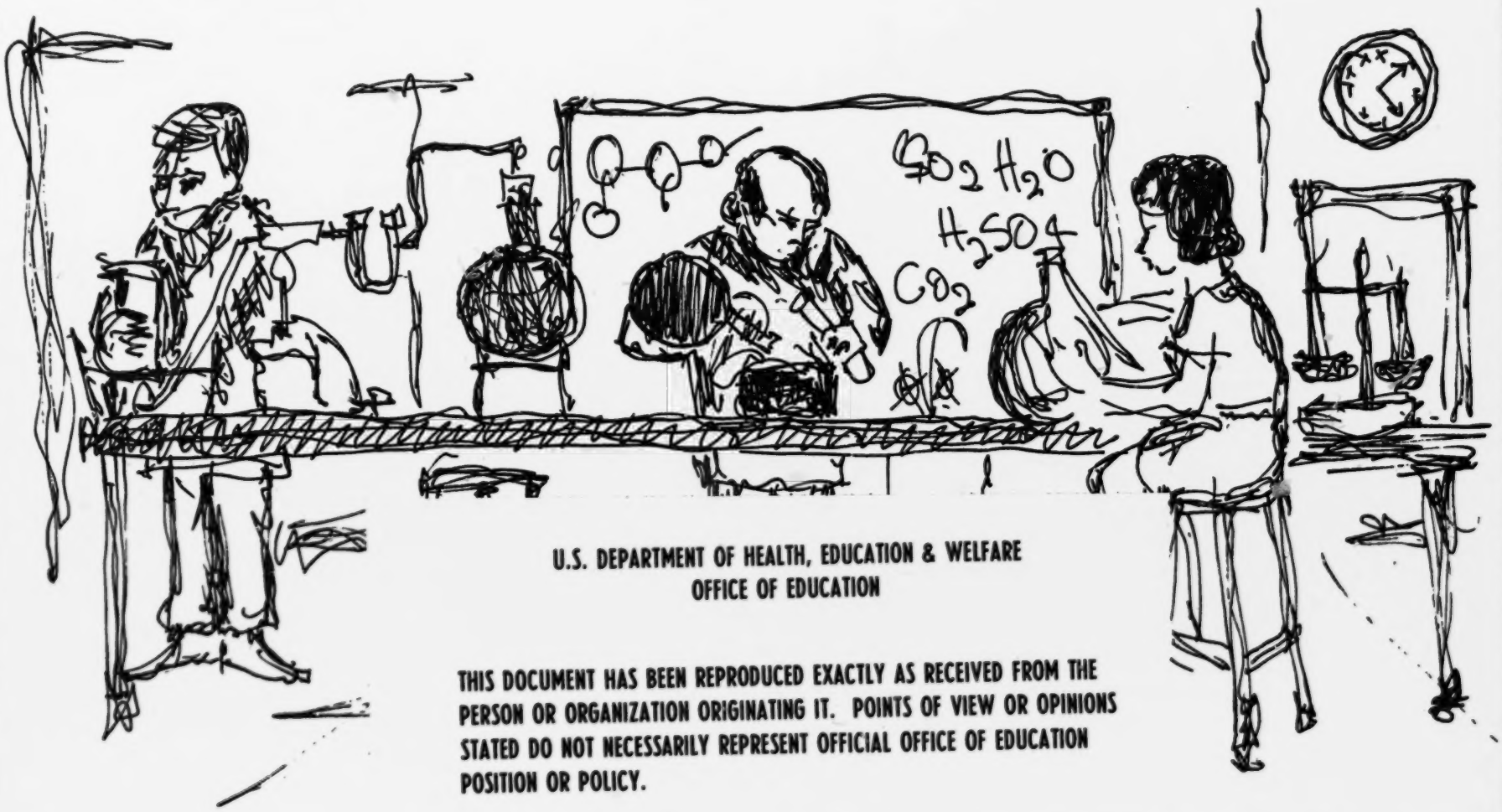

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TELEVISION

IN

SCIENCE EDUCATION

SE 004 842

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This report concerns the National Center for School and College Television's conference on television in science education. The conference was conducted to assess television materials now being offered in science in an effort to stimulate the development of increasingly effective television materials for the nation's schools. The report is divided into three sections:

- *Part I is a status report of science telecourses being offered in the United States during the 1966-67 school year.*
- *Part II is an overview of the discussion among the eleven science and television authorities who participated in the conference.*
- *Part III is a tabular breakdown of the information gathered. The materials listed in this section form the basis for Part I. Lessons from most of the telecourses listed here were viewed during the conference.*

The eleven conferees viewed sample lessons from telecourses, reviewed print materials (teacher's manuals and student work materials), and, during the final session, considered the state of television in science education.

The eleven authorities who joined NCSCT staff members at the conference are Mildred Ballou of Ball State Teachers College in Indiana; Lawrence Binder of the National Science Foundation; Lee Franks, executive director of television for the Georgia State Department of Education; Robert Gerletti of the Los Angeles County Schools in California; Richard Haney of the University of Wisconsin; Arthur Livermore of the American Association for the Advancement of Science; Rhea Sikes of educational television station WQED in Pittsburgh; Donald Statler of the Portland, Oregon, Public Schools; Fred Tuttle of the National Aeronautics and Space Administration; Paul Westmeyer of Florida State University; and Donald Wood of the Educational Television Branch of the Hawaii Department of Education.

Part I—The Status of Television in Science Education

For this conference, questionnaires were sent to 116 educational television stations and two closed-circuit facilities. Information resulting from those questionnaires is the basis for this section of the report. This report does not consider materials developed or offered by commercial television stations. It is concerned with materials used only in classroom instruction.

Seventy-nine different telecourses were found in use at the elementary and secondary levels. One program was designed for in-service teacher education.

ELEMENTARY GRADE LEVEL

GRADE EMPHASIS The division according to grades revealed a heavy but anticipated emphasis on materials designed for elementary education. Eighty-two percent of the telecourses (66 courses) was designed for use at the elementary grade level.

Seventy-three percent (47 courses) was intended for the intermediate grades (grades four through six) while 27 percent (19 courses) was intended for the primary grades (K through three).

FREQUENCY OF TRANSMISSION Of the sixty-six elementary grade level telecourses, 73 percent was designed to be used throughout an entire academic year, and 27 percent was intended for use for a single semester.

Of the sixty-six telecourses, 40 had a transmission rate of one lesson each week, 22 telecourses had a rate of two lessons each week, and four telecourses had a rate of three lessons each week.

RECORDED OR UNRECORDED Almost 90 percent of the telecourses at the elementary grade level was recorded and available for later use.

USED BY OTHERS Less than one-third of the telecourses was used by stations other than the producing station.

SECONDARY GRADE LEVEL

GRADE EMPHASIS Thirteen telecourses were designed for the secondary grade level. This was 17 percent of the total number of telecourses.

FREQUENCY OF TRANSMISSION Of the 13 secondary grade level telecourses, nearly 77 percent was designed for use for a complete academic year, and 23 percent was designed for one semester.

Five of the 13 telecourses had a transmission rate of one lesson each week, three telecourses had a rate of two lessons each week, a single telecourse had the rate of three lessons each week, and four telecourses had a rate of four lessons each week.

RECORD OR UNRECORDED Eleven telecourses were recorded and available for later use.

USED BY OTHERS Six of the telecourses were used by stations other than the producing station.

IN-SERVICE TEACHER EDUCATION

Only one 30-minute program was designed for teacher education.

Part II—An Overview

NCSCT is conducting additional meetings with science and television authorities as a result of its first assessment of television in science education. The science authorities, convinced of television's potential in science education, urged additional conferences to permit further analysis, the development of standards for television production, and the development of review and testing methods for materials based on those standards.

The 11 authorities explored the current status of televised science lessons for elementary and secondary schools. At the conference they viewed and discussed portions of 80 lessons, representing the output of most of the educational television stations in the country. They were able to review enough of each lesson to permit valid judgments.

Among the subjects considered were the quality of the television teaching, the science content of the lessons, the validity of television as an instructional medium in science education, the objectives of televised science lessons, and the usefulness of related materials such as teachers' guides. Comparisons were made between the functions of the television teacher and those of the classroom teacher.

While there was not complete agreement among the conferees on all points considered, several generalizations and questions concerning the overall use of television in science teaching were formulated. These are here reported.

There was agreement that improvements are needed in all phases of school television in science education.

Use of the Medium. Four major functions of televised science lessons were identified. Some telecourses apparently are intended as the sole instruction available. In a larger number of instances televised lessons represent the major portion of the science program. These lessons are intended to receive support from a classroom teacher in the form of introductory lessons, summary lessons, drill, and testing. A third kind of situation involves the use of television as a minor contributor to the instructional program which, in turn, is accompanied by other instructional activities and media. Still a fourth use is the influence the television lesson's content and method has on the classroom teacher. In one instance the in-service education of the teacher was the explicit aim. In most other instances possibilities for the television lesson to effect the classroom teacher in terms of his subject matter competency, his attitudes toward science teaching, and his teaching techniques were obvious. These influences caused considerable speculation among the conference participants.

The effectiveness with which televised science lessons can serve these functions must be explored. In spite of the use of television for instructional purposes there still remains a great need for classroom teachers who are well prepared in terms of subject matter and teaching ability. On the other hand, the television teacher tends to assume a significant place in the science program and his influence cannot be ignored.

Quality of Television Teaching. The role and influence of the television teacher is not fully understood at present and should be the subject of further research. The conferees identified two attributes of a good television teacher:

> . . . (1) He must have the ability to develop some form of rapport with his audience and to be skillful in communicating with his unseen pupils.

. . . (2) He must have an excellent understanding of his subject matter. These qualities, of course, are related.

It appears that the quality of the teaching in a majority of the television lessons is not superior to that in many classrooms. Very likely increased attention must be given to the selection and training of television teachers. Perhaps there is a need also for supervision of the television teacher in terms of the validity of the subject matter, the organization of the lesson, the use of scientific apparatus, and the use of appropriate teaching procedures.

Throughout the discussions at the conference it was difficult for the participants to separate in their thinking the performances of the television and classroom teachers. The following comment was typical. "Regardless of what we want television to contribute, the television teacher becomes a model for all other teachers; if he stresses verbal learning the classroom teacher will do likewise."

Few generalizations concerning classroom and television teachers were possible because of the great variation in the quality of teaching. Some television teachers are better than some classroom teachers and vice versa. Attempts to make this comparison are complicated by the fact that these two teachers are not always trying to do the same thing. The criteria for judging who is "better" are not clear at present. The fact that these comparisons were attempted probably illustrates the conferees' uncertainty concerning the roles of these two persons.

The prominence of the television teacher in the lessons was questioned by some who thought that perhaps the content should be more dominant than the teacher. On the other hand the personality of the television teacher may have an important influence on learning, a fact which is not fully understood or exploited at present. Since the televised science lesson is usually employed as part of a larger instructional program carried on within the school, the classroom teacher and the situation within which he operates should be the subject of research.

In the lessons that were viewed one or two attempts were made to involve the pupils as more than passive receptors of information. In one lesson the television teacher provided a three-minute break during which the pupils were to discuss the points made earlier. Other possibilities for stimulating pupil involvement emerged during the discussions. Among these was the suggestion that the television lesson be so structured that the classroom teacher could turn it off when the students had reached a desirable level of readiness for work on their own. It was also thought that the television teacher could suggest pupil activities to be performed in the classroom or at home.

Contents of the Lessons. In many lessons there were subject matter errors which could have been corrected had the lessons been viewed by subject matter specialists. Two types of errors occurred, both common to television and classroom instructor. Errors committed in televised lessons, however, are perhaps more serious because of the size of the viewing audience. One type of error occurs when the teacher is trying to simplify in order to adapt material to the level of pupil maturity. The problem of reducing the frequency of this type of error will be solved only after curriculum workers have a greater understanding of the ways in which children conceptualize natural phenomena. To what extent can an adult topic be simplified without destroying its validity at the pupils' level of understanding? The second type of error results simply from the teacher's misunderstanding of the subject. These errors can be reduced by improvements in the education and selection of teachers and the use of science curriculum consultants during the production of television lessons.

The appropriateness of much of the content for presentation by means of television can also be questioned. In many of the lessons the content was not selected on the basis of the unique qualities of the television medium. Much of what was viewed could just as well have been taught by classroom teachers. This leads to the question of exactly what the role or roles of school television should be.

Validity of Television as an Instructional Medium. The 80 television lessons left the participants in the conference with a strong impression that the role of school television in science education needs to be clarified.

There is a need to define what aspects of the science program should be dealt with by means of television.

Who should determine the science curriculum for a particular class? Several participants expressed the point of view that the classroom teacher should be the one to select the specific content to be taught and the learning activities to be employed in the classroom and that telecasts should be employed along with other media.

"The content has to be supplied by some route and television can be one of these routes," said one conferee.

The effectiveness of a televised lesson depends not only on its subject matter but also on the ways in which the videotape is used in the classroom. To aid the teacher, guides are needed that show the relationship of the lesson to the total science unit and course. Guides should also contain suggestions for introductory and follow-up lessons. Many of the guides accompanying the sample lessons studied during the conference could have been improved.

One of the unique features of television is the rigid schedule of the broadcasts which requires that children in all participating schools view a given lesson at the same time. Some conferees regarded this as a "straight jacket" that inhibits the flexibility of the program in individual schools. Others defended it in terms of the stimulus it provides for all schools to keep from lagging in their treatment of the subject. To overcome this attribute of televised lessons that are broadcast some proposed that a "systems approach" be developed in which videotaped lessons or portions of lessons would be accessible to classroom teachers over closed-circuit systems at the push of a button.

Objectives of Television Instruction. Participants in the conference were encouraged to suggest and explore other innovations in the use of television in science education. At one point they were asked, "If we could remake science instruction, what role would you like to see television playing in the near future with the use of the present technology?" Among the response were the following:

. . . (1) Television should be used for the in-service education of teachers in terms of both subject matter and instructional methods. Lessons might be used to describe and to show ways of implementing the materials produced by recent science curriculum projects.

. . . (2) Emphasis should be placed on the use of television to aid the classroom teacher and not to replace him. Lessons should be designed to come at a variety of places in a science unit and to be more peripheral than central, so that the predetermined broadcast schedule would not set an unrealistic pace for many schools. Televised lessons that supplement the science unit by raising questions, showing applications of principles, and bringing in relevant current events are of the type that could serve this function.

. . . (3) Televised lessons should be subject to continual revision and innovation. The medium's flexibility should be exploited to keep the televised materials up to date, free from error, and as relevant to the courses of study as possible.

. . . (4) Television can serve a public relations function for the schools. Parents should be encouraged to view the broadcast and learn from them ways in which they can work with their children in science. Good public relations can also be achieved by means of telecasts describing the schools' science program and objectives.

Conclusions. The major accomplishments of the conference were the general exploration of the status of the art, the identification of problems, and the exploration of issues. "Need research" was a recurrent theme in the discussions. Television in education is apparently here to stay. At present it has many faults and unrecognized potential which need to be explored. Teachers are using television and we have to find out how and why. Above all, the question of how television ought to be used remains unanswered. This exploratory conference is being followed by another NCSCT-sponsored conference in which school television in science education will be more thoroughly analyzed and standards for the development of televised lessons will be suggested.

Part III—Television

TITLE OF TELECOURSE	PRODUCER	PRODUCTION LOCATION	GRADE LEVEL	NO. OF LESSONS	LESSON LENGTH	FREQ. OF BROADCAST
		PRIMARY COURSES				
ALIVE AND ABOUT	WEDH	Hartford, Conn.	K-3	26	20'	1/wk
ALL ABOUT YOU	WGBH	Boston, Mass.	1-2	11	15'	1/wk
FIRST LOOK AT SCIENCE	KCTS	Seattle, Wash.	1	33	15'	1/wk
DISCOVERING SCIENCE	KLRN	Austin, Tex.	3	29	20'	1/wk
ISN'T IT WONDERFUL	KDPS	Des Moines, Ia.	2	35	15'	3/wk
JUST WONDERING	KOAC/KOAP	Eugene, Oreg.	1	31	15'	1/wk
LAND AND SEA	WGBH	Boston, Mass.	3	15	15'	1/wk
PRIMARY SCIENCE	WXXI	Rochester, N. Y.	K-3	32	15'	1/wk
PRIMARY SCIENCE	KCET	Los Angeles, Calif.	1-2	16	15'	2/wk
EXPLORING SCIENCE—2	KDPS	Des Moines, Ia.	2	35	15'	1/wk
SCIENCE—3	KTCA	Minneapolis, Minn.	3	35	15'	1/wk
SCIENCELAND	MPATI	Lafayette, Ind.	1-2	32	20'	1/wk
SCIENCE IS EVERYWHERE	WTVS	Detroit, Mich.	2	36	15'	1/wk
SCIENCE CORNER	MPATI	Lafayette, Ind.	3	128	20'	2/wk
SCIENCE IS DISCOVERY	WTVS	Detroit, Mich.	3	35	15'	1/wk
SCIENCE IS FUN	WTVS	Detroit, Mich.	1	35	15'	1/wk
SCIENCE WITH CHARLIE		St. Lawrence Valley ETV, N.Y.	K	14	15'	1/wk
WONDERING WITH SCIENCE	WKNO	Memphis, Tenn.	3	36	20'	2/wk
NEIGHBORHOOD EXPLORERS	WGBH	Boston, Mass.	2	15	15'	1/wk
		INTERMEDIATE COURSES				
A TIME TO DISCOVER	P.S.*	Santa Ana, Calif.	4	71	15'	2/wk
A TIME TO WONDER	P.S.	Santa Ana, Calif.	5	71	15'	2/wk
ADVENTURES IN SCIENCE	WHRO	Norfolk, Virginia	5	70	20'	2/wk
ADVENTURES IN SCIENCE	WDCN	Nashville, Tenn.	6	72	30'	2/wk
ALL ABOUT SCIENCE	WHRO	Norfolk, Virginia	4	34	20'	2/wk
ELEMENTARY SCIENCE—5	KNME	Albuquerque, N. M.	5	70	20'	2/wk
ELEMENTARY SCIENCE—6	KNME	Albuquerque, N. M.	6	70	20'	2/wk
EXPLORING WITH SCIENCE	MPATI	Lafayette, Ind.	5	64	20'	2/wk
EXPLORING NATURE	WGBH	Boston, Mass.	5-6	30	30'	1/wk
EXPLORING SCIENCE	WNYE	Brooklyn, N. Y.	5	30	20'	1/wk
FOCUS ON SCIENCE	WXXI	Rochester, N. Y.	5	30	30'	2/wk
INQUIRY INTO LIFE	WETA	Washington, D. C.	5-7	30	30'	1/wk
LET'S INVESTIGATE	WGBH	Boston, Mass.	4	15	15'	1/wk
LET'S EXPLORE SCIENCE	KOAP/KOAC	Eugene, Oreg.	4-6	14	15'	1/wk
NOW WHAT?	WQED	Pittsburgh, Pa.	4-6	10	20'	1/wk
PRIMARY CONCEPTS OF SCIENCE	D.P.I.†	Pennsylvania	3-4	15	12'	1/wk
PROBING SCIENCE	KYNE	Omaha, Nebr.	5	33	15'	1/wk
SCIENCE—4-5	WNED	Buffalo, N. Y.	4-5	15	20'	2/wk
SCIENCE—4	WQED	Pittsburgh, Pa.	4	61	20'	2/wk
SCIENCE—4	WHRO	Norfolk, Va.	4	34	20'	1/wk
SCIENCE—4	P.S.	Anaheim, Calif.	4	68	15'	2/wk
SCIENCE—5	WQED	Pittsburgh, Pa.	5	49	23'	2/wk
SCIENCE—5	P.S.	Anaheim, Calif.	5	6	20'	1/wk
SCIENCE—6	WQED	Pittsburgh, Pa.	6	49	23'	2/wk
SCIENCE—6	MPATI	Lafayette, Ind.	6	32	20'	1/wk
SCIENCE ADVENTURES	KYNE	Omaha, Nebr.	4	32	15'	1/wk
SCIENCE IN INDUSTRY	WEDH	Hartford, Conn.	4-6	26	20'	1/wk
SCIENCE IS A WAY OF THINKING	KQED	San Francisco, Calif.	5	28	20'	1/wk

in Science Education

TITLE OF TELECOURSE	PRODUCER	PRODUCTION LOCATION	GRADE LEVEL	NO. OF LESSONS	LESSON LENGTH	FREQ. OF BROADCAST
INTERMEDIATE COURSES (Continued)						
SCIENCE AND YOU	KDPS	Des Moines, Ia.	6	65	20'	5/wk
SCIENCE FOR...YOU	P.S.	Los Angeles (City), Calif.	6	17	30'	1/wk
SCIENCE LAB II	KERA	Dallas, Tex.	4-6	35	15'	1/wk
SCIENCE ROOM	WVIZ	Cleveland, Ohio	3-6	32	20'	1/wk
SCIENCE SPOTLIGHT	WETA	Washington, D. C.	3-7	30	30'	1/wk
SCIENCE TODAY	KYNE	Omaha, Nebr.	6	35	15'	1/wk
SCIENCE QUEST	KLRN	Austin, Tex.	5	29	20'	1/wk
SEARCH FOR SCIENCE	WVIZ	Cleveland, Ohio	4	32	15'	1/wk
SEARCH LIGHT ON SCIENCE	KDPS	Des Moines, Ia.	5	75	20'	5/wk
UNDERSTANDING SCIENCE	WNYE	Brooklyn, N. Y.	4	30	20'	1/wk
WONDERING WITH SCIENCE	WKNO	Memphis, Tenn.	4	36	30'	2/wk
WONDERING WITH SCIENCE	WKNO	Memphis, Tenn.	5	60	20'	2/wk
WONDERING WITH SCIENCE	WKNO	Memphis, Tenn.	6	60	20'	2/wk
WONDERWORLD OF SCIENCE	WHRO	Norfolk, Va.	6	70	20'	2/wk
WORKING WITH SCIENCE	WNDT	New York, N. Y.	6	30	20'	1/wk
WORLD OF CHANGE	WGBH	Boston, Mass.	6	30	20'	1/wk
WORLD OF SCIENCE	WDCN	Nashville, Tenn.	4	72	30'	2/wk
WORLD OF SCIENCE	WEDU	Tampa, Fla.	6	35	15'	5/wk
WORLD OF SCIENCE	WCVE	Richmond, Va.	6	32	30'	1/wk
SECONDARY COURSES						
AIBS BIOLOGY	D.P.I.	Pennsylvania	10-12	30	30'	5/wk
ASTRONOMY	WSIL	Carbondale, Ill.	10-12	15	30'	1/wk
EARTH AND SPACE SCIENCE	KTCA	Minneapolis, Minn.	7-9	40	20'	1/wk
FROM DARKNESS INTO LIGHT	D.P.I.	Pennsylvania	11-12	12	30'	1/wk
GENERAL SCIENCE—9	KNME	Albuquerque, N. M.	9	24	30'	1/wk
HORIZONS OF SCIENCE	WEDU	Tampa, Fla.	9	146	25'	6/wk
INVESTIGATING THE WORLD OF SCIENCE	MPATI	Lafayette, Ind.	7-10	64	30'	2/wk
NATURE OF MATTER	MPATI	Lafayette, Ind.	7-10	32	30'	1/wk
NEW DIMENSIONS IN SCIENCE	WHRO	Norfolk, Va.	7	26	30'	2/wk
OUR PHYSICAL WORLD	WHRO	Norfolk, Va.	9	130	25'	6/wk
SECONDARY SCIENCE	WEDU	Tampa, Fla.	8-10	146	25'	6/wk
SCIENTIFIC GEOGRAPHY	KOKH	Oklahoma City, Okla.	7	137	25'	6/wk
WONDERING WITH SCIENCE	WKNO	Memphis, Tenn.	8-9	36	20'	2/wk
IN-SERVICE TEACHER EDUCATION COURSES						
ELEMENTARY SCIENCE ORIENTATION	KNME	Albuquerque, N. M.	In-S	1	30'	

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THE NATIONAL CENTER FOR SCHOOL AND COLLEGE TELEVISION serves all institutions concerned with the use of television in education. NCSCT makes available recorded lessons of the highest quality for preschool, elementary, secondary, college, extension, industrial, and continuing professional education.

To relate its activities to the major needs of institutions throughout the United States, NCSCT works closely with content specialists, administrators, professional groups, and regional television organizations.